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ABSTRACT

Televised continuing education provides an opportunity for educational institutions to expand their borders, to gain new students and to meet the needs of prospective students unable to conform to the time and space demands of traditional education. As American society ages, increasing numbers of non-residential (non-campus) students are seeking access to formal instruction. To be effective, televised instruction must maintain the high standards of traditional academia and should be evaluated based on the needs of learners and the resources of the originating institution. Successful video instruction, regardless of the specific medium, should be developed utilizing systematic instructional design methods and should be the result of a "team effort" by both education and production specialists. When effectively created, developed, and delivered, televised education provides an excellent tool for reaching and attracting adult learners as individuals, groups with similar interests, and as members of professions. (Seventeen references are attached.) (RS)

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THE MEDIATED DELIVERY OF EDUCATION:

CAN HIGH-TECH DELIVERY SYSTEMS EFFECTIVELY SERVE ADULT LEARNERS?

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THE MEDIATED DELIVERY OF EDUCATION: CAN HIGH-TECH DELIVERY SYSTEMS EFFECTIVELY SERVE ADULT LEARNERS?

"The question is not which medium works best but what is effective instruction." V. Bergin

"The medium is the message." Marshall McLuhan

INTRODUCTION

The adaptation of new technologies for use in education is anything but a new proposition. Indeed classroom closets often sit full of once heralded educational technologies, these items now relegated to the task of dust collection. Yet as technologies advance it seems natural to attempt to utilize them constructively in educational settings. Technology, especially that oriented toward information and communication, is changing at an ever increasing rate and is providing an ever-widening range of options to contemporary educators.

An extraordinary number of electronic communications devices exist which have potential application in education: interactive video-disc players, videotape players, satellites, cable television, radio, broadcast television, Direct Broadcast Satellite (DBS), Instructional Televised Fixed Service (ITFS), microwave transmission, computers and others. The trend of increasing electronic media options has made media choice a much more complex decision (Bates, 1984).

But do these high technology communication tools provide substantial benefit to adult educators and learners? Do the new technologies improve or possibly diminish the quality of instruction available to learners? At this point in time, not all of these questions have been examined through systematic research. Opinions about new educational technologies, however, range from skepticism to avid support. One thing is clear, new communication technologies are impacting our society and our educational system more extensively each year and they cannot be ignored. Both problems and opportunities arise from their use.

This report will focus primarily on the application of television (video) based instruction. It will examine several aspects of video delivery systems including: their various designs, motivation for their use, preparation of instructional materials, examples of technologies in use, and a summary of research in the field.

While several different technologies are presented independently, it is necessary to understand that the "borders" between various communication technologies are growing increasingly imprecise. Many technologies overlap in their design, usage and capabilities.

The first widespread national use of television technology as a legitimate educational medium was the British Open University. Established in 1969 this "university of the air" was a "radical innovation" at the time but has since proven successful in providing instruction to distant students (Bates, 1984). The wide use of instructional radio, television and film goes back decades in the United States. Television courses were broadcast over 30 years ago in the U.S. utilizing a traditional televised lecture format. The City College of Chicago offered college courses for credit via the local public television station in 1956 (Hudspeth, 1986). The "talking head" and the filmed or taped classroom lecture format of many early programs have been generally criticized for their failure to take advantage of the strengths of the various media. Pittman (1987) points out that

despite the early predictions of the potential of televised instruction, the medium has been a disappointment. Moore (1987, pg. 2) posits, however,

> if television has been misused or underused it is not the failure of the television producer but educators have failed to use the medium.

Regardless of the perceived success or failure of the medium, the use of televised learning is substantial. Over 500 colleges in the United States alone offer telecourses each year to students numbering in the hundreds of thousands (Hudspeth, 1986). The incorporation of new technologies could potentially greatly expand the number of students able to access education. No longer will participation in education be strictly limited by time and place.(Dede, 1982)

MOTIVATIONS FOR USING NEW EDUCATIONAL TECHNOLOGIES

The mere presence of new technologies does not, in and of itself, provide motivation for adoption in the educational environment. The changing needs of adults in our society are a prime impetus in the growing development and use of the new technologies. The number of part-time students and older (non-traditional) students is increasing and is expected to continue to grow in the future. These trends suggest an increasing diversity of needs of students, needs which institutions of higher learning may be forced to meet in creative and competitive ways (Gessner, 1987). As our society ages, increasing numbers of non-residential (non-campus) students are seeking access to formal instruction (Hudspeth, 1986; and Brock 1987). Individual motivations include such areas as schooling, as a solution to personal problems, career enhancement or advancement, and/or a desire for increased productivity. Often, however, time and distance separate the learner from the teacher. An increasing number of learners are unwilling or unable to travel to a campus to take a course (Hudspeth, 1987). From an institutional cost savings standpoint, technologies will allow more efficient use of existing resources. For example, telecommunications may be used to deliver a course at a distant site, thereby avoiding the need for a professor to drive great distances to teach a course (Queeney, 1987).

Various external influences are also increasing the need for mediated professional education. Increased pressure on educational institutions for productivity will lead to a greater emphasis on lifelong learning outside of the traditional classroom, especially involving technologies which deliver training to the work site (Miller, 1982). Similarly, increasing cost-consciousness in industry has created pressure to identify and develop alternative training methods for employees. The time and cost associated with traditional professional workshops and seminars are catalysts in influencing the utilization of mediated training tailored to the scheduling needs of the company. (Queeney, 1987; and Anderson, 1987)

Two trends in professional education are also pushing for more accessible education and training. First, the technological and social changes occurring in many professions are creating increased demand for ongoing professional education (Queeney, 1987). In the health care industry, for example, continuous training must be made available to doctors and nurses, while keeping to a minimum the time they must spend away from their duties

(Anderson, 1987). Second, governmental bodies and professional associations are increasing the demands upon professionals to take part in mandatory training (Queeney, 1987). In summation according to Hudspeth (1986, pg. 2),

> Professionals and the public who may have little interest in another degree still need to access a system of learning in which content is carefully structured, materials are systematically designed, and the experience of learning is efficiently organized.

While traditional educational environments, workshops, seminars, conferences and classes offer many advantages over televised instruction (face-to-face interaction, shared participation, spontaneity and control over the audience) the cost and time saving aspects of mediated education warrant serious attention (Anderson, 1987). In education, however, the adoption of new methodologies and technologies is a slow process (Norwood, 1982). Keller, as quoted in Coldeway (1987), graphically portrays educational change as analogous to "taking a wounded moose from a pack of starving wolves".

VIDEO BASED TECHNOLOGIES

As indicated above, the focus of this report will be on video based technologies including cable television, ITFS, audio and video teleconferencing, satellites and live interactive programming. Again the reader is reminded that each of the following media has similarities which may overlap.

According to Hudspeth (1986), cable television should be viewed as the "complete telecommunication system". This view emanates from the highly flexible nature of cable television and its potential for addressing a wide range of needs. Cable television is capable of providing mass and narrowcast program to broad or specific audiences, one-way or interactive audio and video, analog and digital signals, computer connectivity, and live and prerecorded programming (Hudspeth, 1986; and Dede, 1982). Cable programming and channel availability also provide the opportunity for extensive repeat program presentation, an excellent technique for meeting the scheduling problems of students (Hudspeth, 1986). Often cable franchise agreements require that the cable companies provide production facilities for use by the community. Taking advantage of such agreement could be an excellent way to cut costs while providing locally pertinent and timely courses (Brock, 1987; and Hudspeth, 1986). Cable should be considered a primary method for reaching an individual either in a distant location or in the immediate vicinity of the originating location. Instructional programming carried by cable (as with most of the other technologies addressed here) may involve either live or pre-recorded presentations.

A related technology designed to provide narrowcast programming to specific audiences (e.g. classes, businesses, and public buildings) is Instructional Televised Fixed Service (ITFS). This service enables limited transmission of programs to predetermined receiving locations. ITFS has attracted little attention during its twenty years in existence (Brock, 1987), but it is a potentially powerful tool for providing educational programming for professionals either individually or in groups at their work location.

Teleconferencing is a method of group learning utilizing "real time interaction among all participants in a manner similar to traditional classroom instruction." (Moore, 1987) The variations on

this technology range from two-way audio only (telephone teleconference) to one-way video and two-way audio to two-way audio and video (fully interactive videoconference). The simplest form of teleconferencing utilizes telephone lines to carry either video or audio signals. Video transmitted via telephone lines is usually "slow scan" video, providing the receiving end of the transmission with still television pictures of the program at the originating end (Anderson, 1987). "Freeze frame" transmission is a low cost alternative to full action video and allows the utilization of some video in addition to voice transmission. More advanced teleconferencing may utilize the local cable system as discussed above. The highest level of teleconference technology is the use of satellites to transmit and receive programming. Satellite technology provides access to a wide variety of educational programming and if properly equipped, enables transmission of on-site programs to distant locations. Utilization of satellite programming requires a substantial commitment to hardware "up-front" but if utilized effectively it can provide a low cost alternative to live seminars and lectures. An innovative utilization of satellites described by Whittington (1987) is to connect the receiving satellite dishes to the local cable facilities for local distribution of programs to distant individual learners. This particular use is well suited to widely dispersed areas or areas with exceedingly rough terrain.

Fully interactive (video and audio) educational transmission is increasingly being delivered using digital coding/decoding equipment (codecs). Through the use of codecs, analog signals are changed to digital information which is then transmitted on special (T-1 data) telephone lines to distant locations. T-1 based videoconferencing provides a relatively low cost alternative to satellite and microwave systems while transmitting full motion (though sub-broadcast standard) video.

Live vs. prerecorded instructional programming. While teleconferencing is obviously live programming, each of the above technologies (including satellites) can be used to distribute either live or recorded materials. The advantage of prerecorded telecourses is the quality of the production. Prerecorded courses incorporate the advantage of extensive planning and instructional design prior to release of the final product. Preproduced programs can unfortunately take up to three years to develop. Live programs, on the other hand, while often less technically sophisticated offer current information, increased relevance through the use of localized information and customs, and the benefit of live interaction between the students and the teacher. Additionally, facilities designed for live two-way programming can serve a variety of purposes for different groups of users in addition to educational uses (e.g. business or administration meetings with distant locations). Indeed, alternate uses of two-way facilities may be necessary to justify the expense of the system. The basic configuration of a two-way system requires a studio and cable access (cost ranges from $10,000 to upwards of $250,000). Addition of microwave or satellite transmission capabilities will increase costs substantially (Hudspeth, 1986). T-1 digital systems provide extra efficiency in that they may be used to transmit computer data during periods when the telephone lines are not being used for course delivery.

IN - PLACE TECHNOLOGIES AND THEIR EDUCATIONAL EFFECTIVENESS

The technologies discussed above are not just hypothetical concepts stored away in hidden research laboratories. Many examples exist of educational technology application in the university and adult education settings.

Learn Alaska was one of the first widespread programs utilizing satellite technology in continuing education in the U.S. Satellite communication was chosen as the primary method of distance education in Alaska mainly due to the immense geographical distances between learners and teachers. Continuing education programs for teachers and educational administrators were the primary focus of programs carried by the system (Whittington, 1987). The system was made extremely accessible by connection to local cable television facilities at the distant locations. In situations such as this, where satellite usage is high, the initial high costs of implementation are often offset by relatively inexpensive usage costs (Forsythe, 1982).

Several universities have adopted other technologies in meeting the needs of their continuing education students. Stanford University has created its own Instructional Television Network (SITN) which presents live and recorded courses primarily in the area of engineering. Stanford also has an ancillary Tutored Video Instruction system which provides unrehearsed course lectures on video tape to small groups of learners along with a discussion facilitator. The indications are that students using mediated education reflect GPAs equivalent to traditional students (Whittington, 1987). ITFS technology has also been utilized effectively for adult education outside of the university setting. Kansas State has extended its boundaries to include the entire state through the use of multiple instructional media including face-to-face lectures, video tape and cable television systems (Carlin, 1987).

The University of North Dakota's Educational Television Network (ETN) provides two-way audio/one-way video communication for credit and non-credit courses throughout the state. Analysis of students' opinions regarding the technology indicated that while students would have preferred two-way video, they were very appreciative of the opportunity to participate in the instruction (Anderson, 1987).

A formal independent evaluation of telecourses offered at Saddleback Community College by Smith (1983) indicated no difference in learning via television versus traditional environments (utilizing ANCOVA techniques to control for previous learning).

On a national level the Public Broadcasting System has initiated the Adult Learning Service (ALS), a cooperative effort involving PBS, local public television stations, communities, colleges and universities. Brock (1987) describes the program as a "fully integrated instructional system" which *always* utilizes television and which includes high quality faculty, study guides and text. ALS is expected to grow into other technologies including cable, ITFS, video cassettes, Direct Broadcast Satellites and computer software in the near future. Unfortunately, a generally skeptical attitude from faculty and lack of commitment from local public stations has made the growth of ALS slow (Brock, 1987).

SUMMARY: ELECTRONIC MEDIA AS AN ELEMENT OF INSTRUCTIONAL SYSTEMS

Televised continuing education provides an opportunity for educational institutions to expand their borders, gain new students and to meet the needs of prospective students unable to conform to the time and space demands of traditional education. Televised instruction, to be effective though, must maintain the high standards of traditional academia and should be evaluated based on the needs of the learners and the resources of the originating institution (Moore, 1987; and Carlin, 1987). Successful video instruction, regardless of the specific medium, should be developed utilizing systematic instructional design methods and should be the result of a "team effort" by the education and production specialists (Hudspeth, 1986). Video instruction is not simply a lecture with pictures but must integrate all necessary media (print *and* face-to-face) and student support services as needed (Atman, 1987).

When effectively created, developed and delivered, televised education provides an excellent tool for reaching and attracting adult learners as individuals, groups with similar interests and as members of professions. Increased **access** and **flexibility** are the primary advantages of televised instruction over traditional educational delivery. It should be remembered, though, that these electronic media are only a part of a wide variety of instructional media and should be used only when appropriate for the institution, the educators, and especially the learners.

It has been shown that, in general, little difference exists between student achievement from televised instruction and face-to-face lecture. This apparent equity of instruction combined with the increased potential for access qualifies televised instruction as an excellent tool for reaching adult learners. Indeed, the medium may **not** be the message as McLuhan suggests. The *message* is not totally dependent upon the technology through which it is delivered but instead lies in well designed instruction. Well designed instruction can be delivered via electronic media as a cost-effective and learning-effective alternative to the traditional classroom setting.

As discussed above, additional momentum is added to the use of electronic media by the increasing proliferation of new technologies in all areas of society. Properly administered, new technologies need not increase the knowledge gap between the lower and higher educated citizens of this country. In fact, utilizing the common medium of television, the existing knowledge gap may in some ways be narrowed by encouraging new groups of students to participate in televised education. Existing cable and public broadcasting systems provide the electronic infrastructure through which courses can be delivered to a wide range of students. Potential students who cannot or who choose not to attend classes in a traditional university setting, may obtain the instruction they desire via television. We must be careful not to view television as a replacement of, but as a supplement and an alternative to traditional schooling.

Technology based continuing education is not, as many seem to believe, designed to ultimately replace the traditional, face-to-face, mode of teaching. It is simply an extension of the university which serves students previously unable to utilize the university's resources. As such it expands the reach of the university while gen-

erating additional revenue and serving the changing needs of our society. The aging of our society and the increasing need for life-long training and retraining will contribute to the demand for supplying training to the learners where and when it is convenient for them. Education will no longer be exclusively a seller's market. Institutions will realize the need to step outside of their walls to meet the increasing needs of society and to increase their enrollment of non-traditional students. Technologies such as satellites, interactive video, microwave transmission, fiber optics and computer assisted instruction will become increasingly necessary in adult and continuing education.

Through the sharing of resources, facilities and pre-produced programs, video-based delivery systems can be developed and operated efficiently by institutions while providing cost-savings and higher utilization. The cost for video-based programming is high and the greater the sharing of all of those costs (equipment, facilities, personnel, development) among several sponsoring organizations or departments, the lower the per user cost of the system. Joint sponsorship of both technology and of educational programming reduces the burden and risk associated with video systems development and operation while at the same time increasing the utilization of the facilities. Similarly, by making programs developed at one location available to other organizations using like video-systems (when the subject matter and approach are appropriate) development costs are further reduced.

As discussed above, change in the educational environment is often slow. For this reason, it is often difficult to institute broad-based changes in structure and procedure. Indeed there is often a fear that as new technologies are introduced to the campus environment, that "real live" educators will be replaced by the new technologies (FEEDS, 1988). It is imperative that current adult education administrators are aware of what technologies are available, their capabilities, and their limitations. In addition to the educational efforts of current continuing educators, existing University Continuing Education curricula should adopt appropriate new technology coursework for future administrators. By implanting courses in new educational technology in Continuing Education programs, future administrators and educators will understand the potential and the limitations of available technologies in reaching distant continuing learners. Education about the capabilities of various technologies will also help to reduce the apprehension that many individuals have towards the systems.

It is crucial that faculty be included in the decision making process regarding the assessment and implementation of new technology systems. They must also understand how the video-based systems will be used (e.g. not to replace them), what the professor's role will be in the development, and the role of the video systems in the overall goals of the university. Similarly, administrators choosing to utilize video-based technologies must adequately train professors and others involved with the video instruction about the creation and development of appropriate courses. Failure to adequately inform individuals about the overall university goals in adopting these new technologies or about the technical and planning aspects, could potentially lead to disinterest or distrust of the proposed technologies.

Off-campus education utilizing new technologies provides for the adult and continuing educator an

opportunity to increase exposure, enrollment, income, and the utilization of resources. Additionally, various new technologies provide the opportunity for educators to meet the needs of growing segment of the educational market. The end result of the partnership of electronic media and the growing market for organized adult education is a potentially positive impact on both learners and educators.

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